DEVICE FOR CONNECTING BUILDING BOARDS, ESPECIALLY FLOOR PANELS

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a National Stage entry under 35 U.S.C. §371 of International Application PCT/DE2004/00148, which was filed on January 30, 2004. Further, the present application claim priority under 35 U.S.C. §119 to German Patent Application No. 203 04 761.3, filed March 24, 2003.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a device for connecting and locking building boards comprising a top side and a bottom side, especially floor panels having a core made of wood material and provided with a groove on at least two opposite side edges, further comprising an insert intended for locking purposes, which insert can be inserted into the groove of one of the side edges, the boards being connected by substantially horizontal displacement.

2. Discussion of Background Information

Such a device is known, for example, from DE 100 34 409. On the insert, a plurality of barbs are formed in mirror symmetry about its center. The barbs are oppositely directed one to another. The insert is inserted into one of the grooves and the groove of the other panel then connected to the insert for connection purposes. The core of the insert corresponds to the groove height. The barbs project beyond the core. The locking is effected non-positively, in that the barbs are forced together in the groove. To prevent mutually connected boards from coming loose, the clamping forces must be high. This means that high joining forces are also necessary, which, particularly in the joining-together of floor panels, can only be applied if the panels are banged together with hammer blows.

Here there is the danger, in principle, that the last blow is administered too strongly and the side edge of the panel is then damaged. In the case of floor panels, any damage to the

side edges is critical, since it possibly remains undiscovered and then absolute leak-tightness is unobtainable at the connecting joint. At such places, moisture can penetrate into the core of the panel. In the case of a laminate panel, the core consists of a wood material, which in this case can swell causing the floor to be destroyed.

SUMMARY OF THE INVENTION

Starting from this problem definition, the object of the invention is to provide a connecting and locking device as described in the introduction, which can be easily handled and is cheap to produce.

In order to solve these problems, the device of the generic type is distinguished by the fact that the insert is provided with at least one resilient lip directed toward the top side or the bottom side.

The insert is inserted into the groove on one side. The newly to be connected panel is pushed onto the insert, whereby the resilient lip is compressed. For locking, the lip then springs back, when it comes into overlap with the locking groove.

Preferably, the insert is provided with two resilient lips directed in opposite directions or toward the bottom side. Consequently, it can be easily connected to both panels. It is particularly advantageous if the insert is symmetrically configured, thereby reducing the production costs.

It is particularly advantageous if the resilient lip has a tip running obliquely to the top side and bottom side, which tip, for locking, cooperates with an obliquely running edge of the groove. The connection thereby becomes positive-locking and is fundamentally permanent.

The insert can be cheaply made if it consists of plastic. In order to save material and enhance the spring characteristics, it is advantageous if the insert has in its core at least one cavity. It is particularly advantageous if the insert has a multiplicity of cavities.

If the insert has midway between the resilient lips a projection which rests on a shoulder, running parallel to the bottom side, of the bottom lip of the grooves, a secure

connection and locking of the panels is achieved, since the insert is prevented from being bent out by a twisting motion of the panels.

In order to obtain a precise-fitting connection of the boards also in the direction running perpendicular to the direction of connection (in the case of floorboards, the vertical direction), the board is provided on one side edge with a tongue pointing substantially in the transverse direction and on the other side edge with a groove corresponding thereto. The grooves into which the insert is inserted can be formed in the bottom lip of the groove and the bottom side of the tongue.

In order to avoid tilting in the joining-together of two boards, the side edges of the insert are tapered outward. They can be rounded or aligned such that they taper to a point. A conically tapered embodiment has the advantage that the boards are mutually aligned when they are connected.

It is advantageous if the insert is inserted into a groove at the factory and, particularly advantageously, is permanently connected to the latter. The handling of the boards during laying is thereby simplified. For permanent connection, the insert can be glued to the groove. In order further to improve the connection of the panels one to another, the grooves and the insert are configured such that, when the panels are mutually connected, the insert is essentially fully surrounded in its peripheral contour by the core material of the boards.

Preferably, the angle of inclination between the obliquely running edge measures between 90° and 135°. The thickness of the insert preferably measures 1.5 5 mm.

The connection has proved highly stable if the depth of penetration of the insert into the groove is 3-8 mm.

It is advantageous if the flexural modulus of the plastic from which the insert is made is 1000-7000 N/mm^2.

Since the top lip and the bottom lip of the grooves into which the insert is inserted end in the same vertical plane, it is advantageous if these are cut with a fixed tool past which the boards are led. The undercuts which produce the locking can thereby be produced cheaply.

BRIEF DESCRIPTION OF THE DRAWINGS

Illustrative embodiments of the invention are to be explained in greater detail below with the aid of a drawing, in which:

Figure 1 shows the side view at the junction of two interlocked panels;

Figure 2 shows the side edges of the panels according to figure 1 in the unlocked state;

Figure 3 shows a first illustrative embodiment of an insert;

Figure 4 shows the side view at the junction of two interlocked panels;

Figure 5 shows the side edges of the panels according to figure 4 in the unlocked state;

Figure 6 shows the insert in single representation;

Figure 7 shows the side view at the junction of two interlocked panels;

Figure 8 shows the side edges of the panels according to figure 7 in the unlocked state;

Figure 9 shows the insert in single representation;

Figure 10 shows the side view at the junction of two interlocked panels;

Figure 11 shows the side edges of the panels according to figure 10 in the unlocked state;

Figure 12 shows a second illustrative embodiment of an insert;

Figure 13 shows the side view at the junction of two interlocked panels;

Figure 14 shows the side edges of the panels according to figure 13 in the unlocked state;

Figure 15 shows a third illustrative embodiment of an insert;

Figure 16 shows a fourth illustrative embodiment of an insert;

Figure 17 shows the side edges of the panels intended for connection to the insert according to figure 16;

Figure 18 shows the side edges of the panels according to figure 17 in the locked state; and

Figure 19 shows one of the panels with an enlarged detailed representation.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

The laminate panels 1, 2 consisting of a core made of wood material, preferably MDF or HDF, are provided on their side edges I, II with a tongue 13 and a groove 14. Beneath the bottom lip 14' of the groove 14, the material of the panel 2 is milled away down to the bottom side 11. Beneath the tongue 13 there is formed, on the opposite side edge I, a groove 15 having a bottom lip 15a. On its side facing the tongue 13, the bottom lip 15a is provided with a groove 3, which has an obliquely running edge 3a. On the opposite side edge II, the bottom side of the bottom lip 14a is likewise provided with a groove 4, which has an obliquely running edge 4a.

As shown by figure 3, the insert 7 serving for the locking is provided with two opposite-acting resilient lips 7a, 7b, which are provided with an obliquely running tip 7c. The insert 7 is configured symmetrical to two principal axes. In the center, it is provided with a cavity 12.

For the connection of the two panels 1, 2, the insert 7 is firstly inserted with the resilient lip 7a into the groove 4, where it rests with the tip 7c against the obliquely running edge 4a and with its bottom side 7d against the further bottom lip 16. For secure fixing, the insert 7 can be stuck in place.

The panels 1, 2 are now pushed horizontally together in the transverse direction Q. When the tip 7' enters the groove 15, the bottom side of the resilient lip 7b runs up against the stop slope 15b of the bottom lip 15a and the resilient lip 7b is compressed. When the panels 1, 2 are pushed close enough together, the resilient lip 7b comes under the influence of the groove 3 and springs back. Its tip 7c engages in the groove and locks with the oblique edge 3a. In the transverse direction Q, the panels 1, 2 are locked via the insert. In the vertical direction, the guidance and locking is effected, supportingly, via the tongue 13 and the groove 14.

The panels 1, 2 shown in figures 4 and 5 are provided on the side edges 1, 2 with a somewhat differently shaped profiling of the tongue 13 and the groove 14. The locking is effected via an identically configured insert 7, as shown by figure 6.

The panels 1, 2 shown in figures 7 and 8 are configured at their opposite side edges I, II with identical grooves 15, which are mirrored about the center axis M. The grooves 3, 4 for locking purposes are formed on the bottom lip 15a and the top lip 15c of the grooves 15. The locking is effected with the previously described locking element 7, as shown by figure 9.

Figure 12 shows a further insert 8. This insert 8 is likewise symmetrical in two principal axes and is provided with opposite-acting resilient lips 8a, 8b, which respectively have an obliquely running tip 8c.

On the side edges, the insert 8 is tapered. The panels 1, 2 (figure 11) are provided with identically shaped grooves 14 mirrored about the center axis M. The tongues 13 form on one side edge I the bottom lip and on the opposite side edge the top lip of the groove 14.

The grooves 3, 4 for locking purposes are provided in the tongue 13. The locking principle corresponds to that which is described above. The insert 8 is inserted into one of the grooves and fixed therein. The two panels are then connected together by displacement in the transverse direction.

With reference to figures 13-15, a third illustrative embodiment of an insert 9 is now described. The insert 9 has a resilient lip 9a, which has an obliquely running tip 9c.

On one side edge I, the panel 1 is provided with a tongue 13, which on its top side is provided with a groove 6 of rectangular cross section. On the opposite side edge II, a groove 14 is milled into the panel 2. The groove 14 has on the bottom side of its top lip a groove 5 having an oblique edge 5a.

The lower lip 9' of the insert 9 is matched in cross section to the groove 6. The insert 9 is inserted into the groove 6 and the connection is effected by relative displacement of the panels 1, 2 one to another. As in the case of the previously described inserts 7, 8, the top lip 9a of the insert 9 also runs at an angle relative to the top side 10 of the panel 1, 2. The angle of inclination of the top side of the resilient lip 9a corresponds to the angle of inclination of that

edge 5b of the groove 5 which adjoins the edge 5a. If the resilient lip 9a comes into overlap with the groove 5, it springs back out and the tip 9c reaches behind the oblique edge 5a, whereby the locking is effected. The vertical locking is effected via the tongue 13 and the groove 14.

Figures 16-19 illustrate a further illustrative embodiment of the device. On their opposite side edges I, II, the panels 1, 2 are provided with grooves 18, 19 of mirror-inverted design, the top lip and bottom lip 18a, 19a of which end in a vertical plane. The insert 17 consists of plastic and has at its outer ends resilient lips 17a, 17b which run obliquely downward and the ends of which are rounded. Jutting out from the core of the insert 17, between the resilient lips 17a, 17b, is a projection 17c, having a face running parallel to the top side of the insert 17.

Figure 18 shows that, when the panels 1, 2 are mutually connected, the insert 17 is essentially fully surrounded by the core material of the panels 1, 2, only the region within the resilient lips 17a, 17b up to the transversely running crosspiece of the insert 17 being excluded. The obliquely running edge 20a, 21a which is formed in the recess 20, 21 so as to be able to lock the insert 17 via the lips 17a, 17b runs at an angle of inclination of 90°-135° relative to the bottom side 11 (if the internal measurements are determined in the manner shown in the enlarged representation in figure 19, the angle of inclination measures 90°-45°). The projection 17c rests on the crosspiece 18b, 19b, running parallel to the bottom side 11, of the bottom lip 18a, 19a.

Good stability of the connection is obtained if the depth of penetration of the insert 7 into the grooves 18 is 3-8 mm. The flexural modulus of the insert is 1000-7000 N/mm^2.

The top lip and the bottom lips 18a, 19a of the grooves 18, 19 end in the same vertical plane. In order to form the undercut through the recess 20, 21, it is advantageous if a fixed blade is used, past which the boards 1, 2 are led. The grooves 18, 19 are therefore not milled, but cut. The production is thereby simplified and made cheaper.